Air Force Research Laboratory|AFRL
Science and Technology for Tomorrow's Air and Space Force

Success Story

SIMULATOR STUDY HELPS VALIDATE SAFETY OF PRK FOR AIRCREW

The Air Force (AF) Surgeon General desired a test to determine whether photorefractive keratectomy (PRK) surgery could obtain refractive correction without impeding visual processing of static and dynamic stimuli in low-contrast and glare conditions. Since haze and glare effects may evolve over time, a meaningful test needed to accommodate a longitudinal evaluation. Scientists at the Human Effectiveness Directorate employed a simulated cockpit to validate visual performance of aircrew after PRK laser eye surgery. Results of this study contributed to the AF Surgeon General's continued approval of PRK to correct myopia and astigmatism in aircrew.

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Accomplishment

Directorate researchers combined three visual performance experiments, using laser and broadband glare in the simulator, with other specialized tests measuring visual performance under aerospace conditions to answer the AF Surgeon General's question concerning aircrew safety after undergoing PRK. The simulator study helped validate the visual performance of aircrew under operational conditions after PRK.

Background

The United States Air Force (USAF) has an ever-increasing number of aircrew requiring the use of spectacles for flying duties. Spectacle wear can create some significant compatibility issues with the unique life support systems that are essential for survival in the aerospace environment.

For over a decade, the AF Surgeon General has approved soft contact lens for aircrew, but not all aircrew can wear soft contact lenses. PRK is another alternative to spectacles and soft contact lenses and may offer some distinct advantages in operational situations.

The USAF had concerns about the aeromedical and operational effects of laser surgery on the cornea. Other types of refractive surgery, including surgical keratoplasty procedures such as radial keratotomy, have resulted in corneal haze, diurnal refractive instability, excessive ocular glare, and change in prescription following prolonged exposure to altitude.

Standard visual acuity tests, which still comprise the primary basis for accession and retention in the military, may underestimate or completely overlook the potential threat from corneal haze and ocular glare. This indicated a need for new tests to evaluate the potential duty impact on USAF.

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (03-HE-25)